will hope, when he eagerly opens a book dealing with the Himalayas, to catch some echo of the music of their melting snows and of their "woodnotes wild"—the scream of the marmot, or the joyful noise of the Dipper (Cinclus) heard above the turmoil of its native waters. He will hope for a few glimpses of their forest-clad buttresses, here aflame with rhododendron or with wild-rose, there dripping with orchid and lichen and moss; now standing out sharp as a two-edged sword, now engulfed in rolling billows of mist. He will hope to catch some reflection of the magic light of their blue and purple valleys.

The sportsman, on the other hand, will expect a good contour map of the country, some remarks on ways and means, on times and seasons, on weapons and kit, on shikaris and guides, and on a multitude of little things, like the effects of a rarefied atmosphere upon wind, eye, and judgment.

But in these Jottings of a Sportsman-Naturalist what the naturalist will find are some very ordinary descriptions of some of the larger mammals that live on the Himalayan slopes, served up along with accounts of certain open-air manœuvres by the author. Each animal is brought upon the stage, usually with some stereotyped introduction, such as "Have you ever had a chance of critically examining a large male serow upon the mountain side?" or "What a fine beast is a noble old ram"; and all the labours of the chase are duly emphasised.

The author describes well-known animals, such as the goral, the serow, the tahr, the markhor, the bharal, the urial, and the black bear, which he (like scores and scores of other men) has seen and followed and shot; the Kashmir stag and the brown bear, which he saw at a distance; and the snow-leopard, the ibex, and the so-called Sikkim stag, which he did not see. All these animals (except the Sikkim stag unseen of the author) have been fully described, again and again, though the author does not mention the fact, by Hodgson, and Blyth, and Jerdon, and Blanford—to name only a few of his many illustrious predecessors. Beyond mammals, he makes some remarks on the jungle-crow, and describes the colouring of three species of pheasants. He also gives several pages to "the lizard of the Himalaya," which he characterises as "an impudent and corpulent little beggar," and caricatures as a "paterfamilias" living with a "spouse," and chastising "a young hopeful."

Nor will the sportsman find much to please him. British officers, of course, have sometimes to be angry and sin, but one does not like to read of a sportsman constantly "turning angrily" upon his shikari, and being followed by grumbling orderlies, and congratulating himself that the rifle (luckily loaded) is in his own hands instead of in those of the enraged guide, and complaining because a rest-house is pre-occupied by people who appear to be extremely civil and considerate. And to all who know Indian servants, how staunchly they stand by their master in times of discomfort, it is positively painful to read of a sportsman whose servant reports unpleasant news "with a note of evil joy in his voice," and tells his weary and hungry master that there is no dinner because no specific order for that meal has been given. This is not the native servant that we all know. Most old Indians can tell of servants who would give and lose all rather than be untrue to their salt.

There are also little things in which the author is perfunctory. That famous old Himalayan shikari General A. A. Kinloch is always referred to as "Kinlock"; that Nestor of Indian naturalists the late W. T. Blanford is referred to once by his proper name, once as "Blandford"; and Dr. Syntax is several times outraged—as in the sentence, "Two essentials are absolutely necessary for he who," etc.

A book professing to deal, however informally, with natural history and wild sport must, quite apart from any literary standard, be also measured by other standards—educational, scientific, philosophical, or technical. By any of these standards this book cannot be classed. About the best thing in it is a plate of a range of snows, facing p. 30, and this is spoilt by a fancy label that leaves the locality unmentioned.

HYDRAULICS.

A Treatise on Hydraulics. By Prof. H. J. Hughes and A. T. Safford. Pp. xiv+505. (New York: The Macmillan Co. London: Macmillan and Co., Ltd., 1911.) Price 16*s*. net.

IN a country so favourably situated for the utilisation of hydraulic power as is the United States, the growing interest in the study of the science of hydraulics, as marked by the rapidly increasing number of text-books on the subject, is not to be wondered at. The book under review is the joint production of the assistant professor of civil engineering and of the lecturer in hydraulic engineering at Harvard University, and is written as a text-book for university students.

An introductory chapter, dealing with the various units involved, is followed by three chapters devoted to hydrostatical problems. In this section, which occupies a somewhat large proportion—some seventy pages—of the book, the

© 1912 Nature Publishing Group

questions of the pressures on plane and curved surfaces, sluice gates and masonry dams, the thickness of pipe walls, and the equilibrium of floating bodies are adequately discussed, while a brief mention is made of piezometers and differential gauges.

Chapter v., which introduces the subject of fluids in motion, is very short and rather disappointing, Bernoulli's theorem, on which practically the whole science of hydraulics is founded, being introduced without any attempt at even an elementary and approximate proof of its truth.

Chapter vi. discusses briefly the flow of water, touching on the questions of hydraulic gradient, critical velocity, methods of measurement, and resistance to flow. In this connection the bald statement that in channels the resistance decreases with a rise in temperature certainly requires modification. In chapters vii. and viii. the Pitot tube and the Venturi meter are very adequately treated.

In chapter ix., dealing with orifices, the theoretical treatment is anything but scientific. The method adopted, common in the older textbooks, consists in assuming that at all points at the same depth in the plane of an orifice, the velocity of efflux is the same, being that corresponding to the head of water above the point, and that the direction of flow at each point is perpendicular to the plane of the orifice. The discharge so obtained is then multiplied by an empirical constant to give the true discharge. Both assumptions are fundamentally unsound, and although the method leads to the usually adopted formulæ, its limitations should certainly be pointed out in any book intended for students. The chapter concludes with a good collection of experimental data, and is followed by a chapter on mouthpieces, including converging and diverging tubes, the experimental data in which are not quite so up to date. Chapter xi. is devoted to a discussion, extending over twenty pages, of Freeman's experiments on fire nozzles.

In chapter xii. the theoretical treatment of weir flow follows on similar lines to that of flow from orifices, but this is followed by a well-written discussion of the experiments and empirical formulæ of Francis, Bazin, Fteley and Stearns, and Smith, and of the United States Deep Waterways experiments on rectangular weirs. Triangular weirs and the trapezoidal weir are then considered, but broad-crested weirs are very briefly dismissed to a table in the appendix. Chapters xiii. and xiv., dealing with float and current-meter work, are good.

In chapter xv., the resistances to pipe flow and the losses at bends and valves are considered. The various exponential formulæ for pipe flow are practically ignored, the Chezy formula being the only one to receive detailed attention.

A good list of experimental data concludes a somewhat disappointing chapter. The flow in open channels is treated in the next chapter, the formulæ of Chezy, Kutter, and Bazin being well discussed. The forms of channel giving best results are given, without, however, any proof that these really are the best forms.

Chapter xvii. is devoted to the impact of water on fixed and moving vanes, and to water hammer. In the latter connection, no attempt is made to develop the simple formula for the rise of pressure following sudden stoppage of motion in a rigid pipe line, while the statement that the intensity of hammer pressures depends primarily on the volume of water in the pipe certainly needs amplification.

The final chapter deals with turbines and centrifugal pumps. The main outlines of the theories of the impulse wheel and of the reaction turbine are stated lucidly, and are illustrated with reference to actual examples. It was surely, however, a mistake to chose the 1895 Fourneyron turbines at Niagara for special mention as modern machines. The chapter is concluded by a very brief discussion, extending over three pages, of the centrifugal pump.

The impression left on the reviewer's mind is one of unevenness. The treatment of the fundamental theorems, on which, as a foundation, the science is built up, leaves a great deal to be desired, and as the book is intended primarily for students this is a matter of great importance. Those parts of the book which deal with experimental data are in general good, and in the hands of an instructor who would elaborate the foundation work it should give good results. The book is clearly printed and well illustrated.

A. H. G.

A HUNTER IN THE UPPER YUKON RANGES.

The Wilderness of the Upper Yukon: a Hunter's Explorations for Wild Sheep in Sub-Arctic Mountains. By Charles Sheldon. Pp. xxi + 354. (London: T. Fisher Unwin, 1911.) Price 12*s*. 6*d*. net.

THE volume before us is essentially a hunter's book, and will be most appreciated by those to whom all incidents of the chase are gratifying. Nevertheless, in Mr. Sheldon the crude hunter is blended and tempered with the field-naturalist, so that his range of observation often goes beyond the requirements of sport. Also, as a hunter, on this occasion he took up the *rôle* of specialist, and set out to kill selectively

© 1912 Nature Publishing Group